Geological Technics Inc.

Work Plan

Well Abandonment

City of Escalon
Former Arco Gas Mini Mart
1305 Escalon Ave.
Escalon, CA

Project No. 750.2
August 11, 2005

Prepared for:
Mr. Doug Stidham
City of Escalon
Engineering & Public Works
P.O. Box 248
Escalon, California 95320

Prepared by:
Geological Technics Inc.
1101 7th Street
Modesto, California 95354
(209) 522-4119

Geological Technics Inc.

1101 7th Street
Modesto, California 95354
(209) 522-4119 / Fax (209) 522-4227

August 11, 2005

Project No. 750.2
Project Name: City of Escalon (Former Arco)

Mr. Doug Stidham
City of Escalon
P.O. Box 248
Escalon, California 95320

RE: Report: Well Abandonment
Location: Former Arco Gas Mini Mart, 1305 Escalon Ave, Escalon, CA

Dear Mr. Stidham:

Geological Technics Inc. is pleased to present the attached Work Plan for Well Abandonment at 1305 Escalon Ave, Escalon, California.

This plan calls for the abandonment of five (5) water table, one (1) deep monitoring and four (4) vapor extraction wells.

If you have any questions or need additional information, please contact me. Thank you for this opportunity to serve your environmental needs.

Sincerely,

Ray Kablanow

Digitally signed by Ray Kablanow
DN: CN = Ray Kablanow, C = US, O = Geological Technics Inc., OU = Professional Geologist
Reason: I am the author of this document
Date: 2005.08.16 09:23:51 -07'00'

Raynold I. Kablanow II, Ph.D.
Vice President

cc: Lori Duncan – SJC PHS/EHD
Jim Barton - CRWQCB-CVR

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Geological Technics Inc.
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Modesto, California 95354
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1.0 INTRODUCTION

The City of Escalon site (COE) is located at 1305 Escalon Ave, Escalon, California in the Highway 120/McHenry Avenue Improvement Project. Figure 1 is a vicinity map and Figure 2 is a site map. This property was previously an Arco Gas and Mini Mart.

Previous work at this site, performed between 1996 and 1999, includes two limited soil borings, soil sample analysis, and the removal of the USTs and pump islands. During removal activities, soil samples were collected which showed the presence of BTEX, TPH-G and MTBE.

On February 12 and 23, 1999 Geological Technics Inc. (GTI) drilled six boreholes, collected soil and groundwater samples (including one groundwater sample from each borehole via hydropunch methods) and tested these samples for petroleum hydrocarbons. Analytical results show the presence of BTEX, TPH-G and oxygenated fuel compounds in the soil and groundwater.

From April of 1999 through January of 2000 three groundwater monitoring wells and four vapor extraction wells were installed on the site. Soil samples collected during the drilling of these wells show low to moderate levels of BTEX, TPH-G, MTBE and TBA in MW-1. Low levels of MTBE were detected in MW-2. Soil samples collected from VEW-1 showed low levels of Xylene and MTBE.

On June 12, 2000, GTI and Del-Tech Geo Technical (Del-Tech) performed a vapor extraction pilot test at the site. Laboratory and field test results indicate the site is conducive to remediation by vapor extraction.

On June 12, 2000, Ms. Lori Duncan of San Joaquin County Environmental Health Department (SJCEHD) requested in writing that a work plan be prepared to define the lateral and vertical extent of the groundwater plume at the site. On June 29, 2000, GTI prepared a work plan proposing the installation of two water table monitoring wells and one deep, discretely screened monitoring well. Ms Duncan approved the work plan on July 7, 2000. The work was performed during the week of October 16, 2000.

On January 30, 2001, GTI prepared and submitted the *Corrective Action Plan (Revised) Vadose Zone Remediation*. The CAP discusses GTI's proposed methodology for mitigation of the documented petroleum hydrocarbon contamination at the site by vapor extraction. The CAP also discusses the confirmation testing outlined in this work plan. Ms Duncan approved the CAP, as submitted, in a letter dated April 02, 2001.

In February 2002 the soil vapor extraction (SVE) system was initiated and has operated for approximately one year. On January 21, 2003, GTI submitted the *Vapor Extraction Treatment System Monitoring Report*. The report indicated that approximately 50% of the petroleum hydrocarbons contained in the subsurface have been removed, the groundwater at this site is free of petroleum hydrocarbon contamination, and possibly as much as 600 gallons of gasoline may remain in the vadose zone. The report also recommended that the site be considered for closure.

In a letter dated February 18, 2003, SJCEHD requested that the well extraction cycle be utilized to address lower screen intervals and that GTI may consider switching methods of contaminant destruction, such as changing to carbon canisters to lower operational costs.

On March 28, 2003, GTI submitted the *Additional Site Characterization – Soil Borings Work Plan*. Ms Duncan approved the work plan, with reservation, in a letter dated April 8, 2003. The soil borings were advanced on September 5, 2003 and GTI submitted the resulting *Interim Soil Investigation Report* on October 2, 2003. As per the April 8, 2003 SJCEHD directive, the SVE system was restarted on December 9, 2003 and ran until January 14, 2004.

A new vapor extraction – granulated activated carbon (SVE-GAC) system was installed during the summer of 2004. The SVE-GAC was started on September 24, 2004 and ran until April 12, 2005. The SVE-GAC was not operational, due to repairs, for three weeks between December 2004 and January 2005.

On May 16, 2005, GTI prepared and submitted a *Risk Evaluation & Appendix B Site Closure Checklist* recommending the COE site be considered for No Further Action. On July 13, 2005, SJCEHD submitted a *Case Closure Summary* to the CRWQCB. The CRWQCB

concurred with SJCEHD's recommendations in a letter dated July 28, 2005. Both correspondences are included in Appendix B.

In a letter dated August 3, 2005, SJCEHD requested a work plan for destruction of all groundwater monitoring and remediation wells at the site. The following work plan addresses the destruction of all wells associated with the COE site.

2.0 WELL ABANDONMENT

There are five (5) water table, one (1) deep monitoring and four (4) vapor extraction wells associated with the COE site. GTI proposes properly decommissioning these wells in an effort to meet requirements leading to a "No Further Action Letter". All monitoring wells associated with the site have been monitored regularly and are in good condition. No obstacles have been observed in any well. A summary of well construction is included as Table 1 in Appendix A and well locations are denoted in Figure 2.

A competent C-57 well driller (selected through bidding process after work plan approval) will be employed to decommission the wells associated with the site. Permits will be secured as necessary and the local regulatory agency will be notified 48 hours prior to commencing work.

The wells will be divided into two categories:

Category 1	Water table and deep monitoring wells including: MW-1, MW-2, MW-3, MW-4, MW-5 and MW-101.
Category 2	Vapor extraction wells including: VEW-1, VEW-2, VEW-3 and VEW-4.

Category 1 Wells:
These wells will be filled with grout via a tremie pipe followed by pressurizing the grout filled wells. Approximately 35 psi of pressure will be applied to each well for up to five minutes. The pressure cap will be removed and the process will be repeated if there is more than three feet of headspace above the grout slurry.

The upper five feet of the borehole will then be drilled out using 8-inch hollow stem augers guided down the center of the well casing via a guide rod attachment on the drill bit. The upper five feet will be backfilled with clean material. The surface will be capped with the appropriate material (i.e. rock or asphalt) to match the surrounding surface conditions.

Special Conditions
MW-3 is located in the median along Escalon Avenue. Encroachment permits will need to be secured and both a north and a southbound lane will be closed during well abandonment (approximately 3 hours).

GTI proposes the following procedure to abandon MW-3:

- Remove well box
- Cut the top of the well casing below grade
- Fill the well casing with grout using a trimie pipe
- Pressurize well casing as described above
- Cement over the well casing making the surface flush with the median

Category 2 Wells:
These wells have been installed below grade and the top of casing does not reach the surface. The tops of casing are approximately 24-inches below the surface and are attached to horizontal vapor conveyance piping leading to a manifold system and the vapor extraction system located in a vault enclosure.

GTI recommends the following abandonment procedure:

- Remove the manifold and valves from the vault.
- Feed 1-inch diameter poly tubing through the horizontal piping and down to the bottom of each extraction well. The poly tubing will act as a trimie pipe.
- Pump grout slurry through the poly tubing into the extraction wells.
- Pull back the poly tubing at ten-foot intervals, keeping the end of the tubing below the water column.
- After the tubing is removed and the horizontal piping is full of grout, pressurize the grout filled wells.
- Approximately 35 psi of pressure will be applied to each well for up to five minutes.
- After each extraction well is cemented in place, backfill the vault with clean soil and cap with appropriate material to match the surrounding surface conditions.

Displaced water will be captured and placed into properly labeled DOT approved containers. The containers will be temporarily stored on-site until disposal can be arranged. Soil cuttings from the well abandonment activities will be stored in properly labeled DOT approved drums and temporarily stored on-site until disposal can be arranged.

Approximately 48.6 cubic feet, or 363.3 gallons, of grout will be required for the decommissioning of the wells associated with the COE site. The calculations used to estimate the volume of grout are attached as Table 2 in Appendix A.

3.0 SCHEDULE & REPORTING

Geological Technics Inc. anticipates beginning fieldwork no later than 45 days after work plan approval and issuance of the applicable permits. The information gathered during this phase of work will be presented in a report in an effort to meet the requirements of obtaining a "No Further Action Letter". Dr. Ray Kablanow, a registered professional geologist, will supervise the project. Copies of the report will be forwarded to both the appropriate County and State regulatory agencies (SJCEHD and CRWQCB).

4.0 SIGNATURE & CERTIFICATION

Geological Technics Inc. will perform this project in accordance with accepted geologic and hydrologic standards of the State of California accepted and in effect at the time of this investigation. Geological Technics Inc. is not responsible for undisclosed conditions.

This work plan was prepared by:

Eric Price

Digitally signed by Eric Price
DN: CN = Eric Price, C = US, O = Geological Technics Inc., OU = Geologist
Reason: I am approving this document
Date: 2005.08.16 09:24:47 -07'00'

Eric L. Price
Geologist

Ray Kablanow

Digitally signed by Ray Kablanow
DN: CN = Ray Kablanow, C = US, O = Geological Technics Inc., OU = Professional Geologist
Reason: I am approving this document
Date: 2005.08.16 09:27:56 -07'00'

Raynold Kablanow II, Ph.D.
California Professional Geologist #5234
Certified Hydrogeologist #442

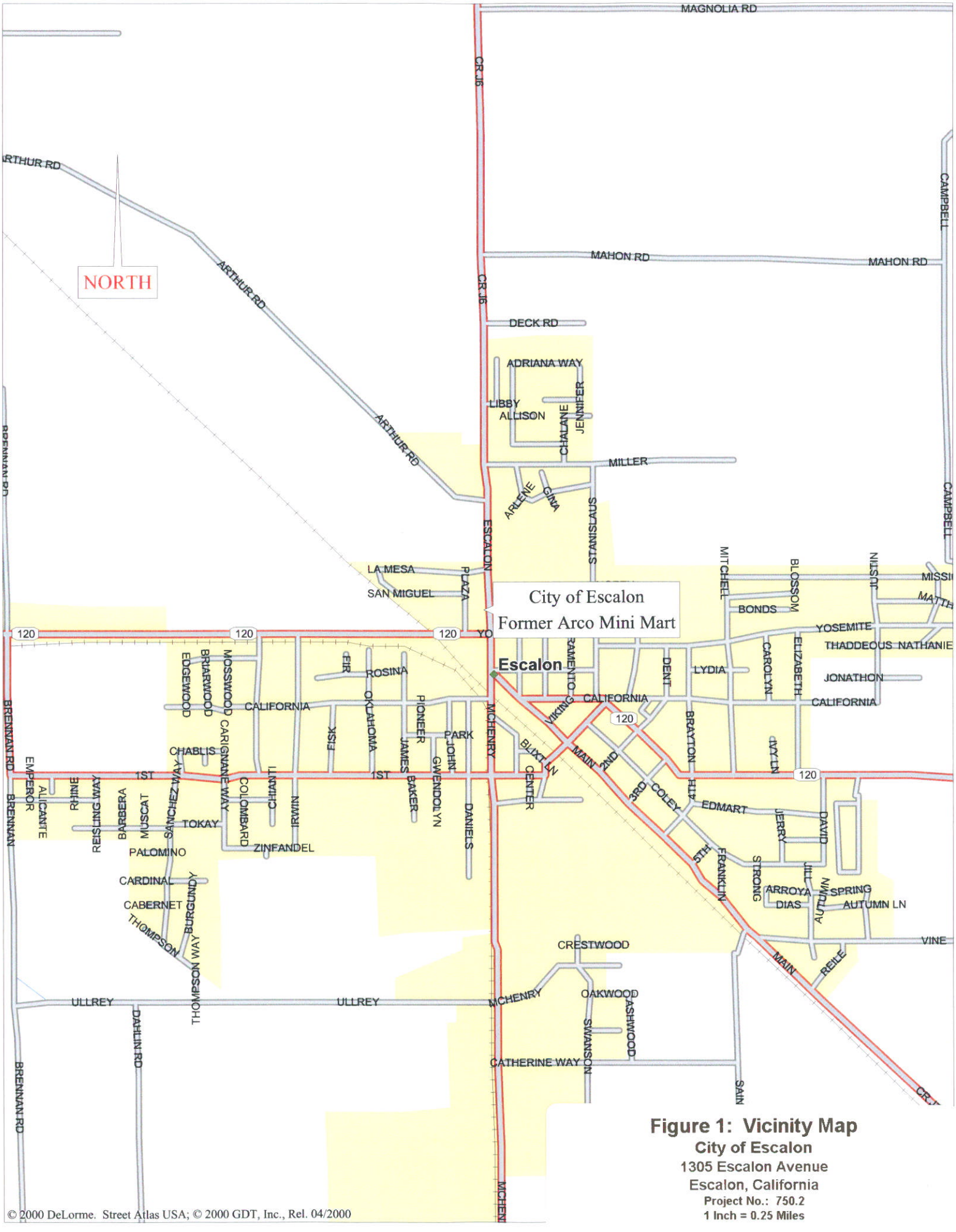

Figure 1: Vicinity Map

City of Escalon
1305 Escalon Avenue
Escalon, California
Project No.: 750.2
1 Inch = 0.25 Miles

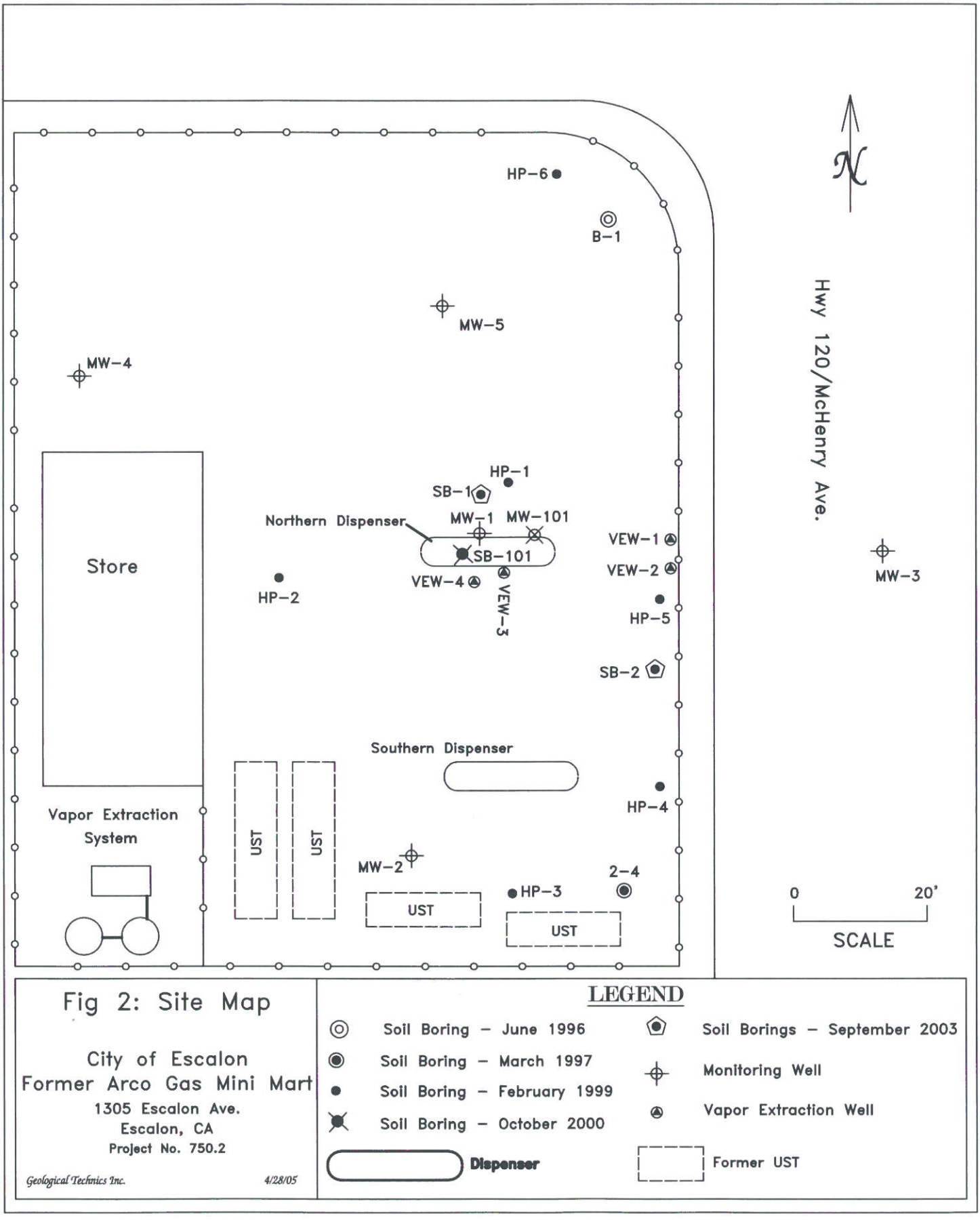

Fig 2: Site Map

City of Escalon
Former Arco Gas Mini Mart
1305 Escalon Ave.
Escalon, CA
Project No. 750.2

Geological Technics Inc. 4/28/05

LEGEND

- Soil Boring – June 1996
- Soil Boring – March 1997
- Soil Boring – February 1999
- Soil Boring – October 2000
- Dispenser
- Soil Borings – September 2003
- Monitoring Well
- Vapor Extraction Well
- Former UST

Appendix A

Summary Tables

Table 1: Summary of Well Construction

City of Escalon-Former Arco Mini Mart
1305 Escalon Ave.
Escalon, CA
Project No. 750.2

Well/Boring Type	Well/Boring Number	Status	Date Drilled	Total Depth (ft)	Boring Diameter (in)	Well Casing Diameter (in)	Casing Type	Slot Size (in)	Sand Type	Well Screen		Filter Pack		Annular Seal		Grout Seal	
										From	To	From	To	From	To	From	To
Monitoring	MW-1		7/30/1999	75	8.5	2	PVC	0.020	#3	75	55	75	53				
					10	2	PVC	0.020	#3					53	50	50	S
Monitoring	MW-2		4/29/1999	75	8	2	PVC	0.020	#3	75	55	75	53	53	51	51	3
Monitoring	MW-3		6/11/1999	76	8	2	PVC	0.020	#3	75	55	75	53	53	51	51	3
Monitoring	MW-4		10/18/2000	80	8	2	PVC	0.020	#3	78	63	78	60	60	58	58	S
Monitoring	MW-5		10/19/2000	76	8	2	PVC	0.020	#3	75.0	60	75	58	58	55.5	55.5	S
Monitoring	MW-101		10/18/2000	95	6	2	PVC	0.020	#3	87	85	89	86	86	83	83	S
Vapor Extraction	VEW-1		4/29/1999	55	10	4	PVC	0.040	Pea Gravel	55	40	55	38	38	36	36	5
Vapor Extraction	VEW-2		4/29/1999	27	10	4	PVC	0.040	Pea Gravel	27	10	27	8.5	8.5	6.5	6.5	5
Vapor Extraction	VEW-3		7/30/1999	55	10	4	PVC	0.040	Pea Gravel	54	39	55	37	37	35	35	S
Vapor Extraction	VEW-4		7/30/1999	27	10	4	PVC	0.040	Pea Gravel	27	12	27	10	10	8	8	S

Table 2: Well Abandonment Spreadsheet

City of Escalon - Former Arco Mini Mart
1305 Escalon Ave.
Escalon, California
Project No. 750.2

Category 1 Wells											
Well ID	Borehole diameter	Borehole diameter	Casing diameter	Casing diameter	Total Depth	Per foot casing vloume	Casing volume	Screen Int.	Filter pack volume	Grout-Total estimated	Grout-Volume estimated
	in.	ft	in.	ft	ft	ft^3/ft	ft^3	ft	ft^3	ft^3	gal
MW-1	10	0.833	2	0.167	75	0.02	1.64	20	3.14	4.8	35.7
MW-2	8	0.667	2	0.167	75	0.02	1.64	20	1.96	3.6	26.9
MW-3	8	0.667	2	0.167	76	0.02	1.66	20	1.96	3.6	27.1
MW-4	8	0.667	2	0.167	80	0.02	1.74	15	1.47	3.2	24.1
MW-5	8	0.667	2	0.167	76	0.02	1.66	15	1.47	3.1	23.4
MW-101	6	0.500	2	0.167	95	0.02	2.07	2	0.10	2.2	16.3
								Estimated Total =		**20.5**	**153.5**

Category 2 Wells											
Well ID	Borehole diameter	Borehole diameter	Casing diameter	Casing diameter	Total Depth	Per foot casing vloume	Casing volume	Screen Int.	Filter pack volume	Grout-Total estimated	Grout-Volume estimated
	in.	ft	in.	ft	ft	ft^3/ft	ft^3	ft	ft^3	ft^3	gal
VEW-1	10	0.833	4	0.333	55	0.09	4.80	15	2.06	6.9	51.3
VEW-2	10	0.833	4	0.333	27	0.09	2.36	17	2.34	4.7	35.1
VEW-3	10	0.833	4	0.333	55	0.09	4.80	15	2.06	6.9	51.3
VEW-4	10	0.833	4	0.333	27	0.09	2.36	15	2.06	4.4	33.0
Horizontal Pipe	NA	NA	4	0.333	60	0.09	5.23	NA	NA	5.2	39.1
								Estimated Total =		**28.1**	**209.9**

Combined Total =	**48.6**	**363.3**

Appendix B

Correspondence

ENVIRONMENTAL HEALTH DEPARTMENT
SAN JOAQUIN COUNTY

Donna K. Heran, R.E.H.S.
Director
Al Olsen, R.E.H.S.
Program Manager
Laurie A. Cotulla, R.E.H.S.
Program Manager

304 East Weber Avenue, Third Floor
Stockton, California 95202-2708
Telephone: (209) 468-3420
Fax: (209) 464-0138
Website: www.sjgov.org/ehd/

Unit Supervisors
Carl Borgman, R.E.H.S.
Mike Huggins, R.E.H.S., R.D.I.
Douglas W. Wilson, R.E.H.S.
Margaret Lagorio, R.E.H.S.
Robert McClellon, R.E.H.S.
Jeff Carruesco, R.E.H.S.

DOUG STIDHAM
CITY OF EXCALON
PO BOX 248
ESCALON CA 95320

KULJIT MANGAT
622 CLAY WAY
RIPON CA 95366

RE: South County Food & Fuel
1305 Escalon Avenue
Escalon CA 95320

SITE CODE: 1487

San Joaquin County Environmental Health Department (SJC/EHD) has received concurrence from the Regional Water Quality Control Board, Central Valley Region on the determination that "no further action is required" for the above referenced site. To proceed with the closure of this site, please submit to SJC/EHD a work plan for destruction of all groundwater monitoring and remediation wells at this site. San Joaquin County well standards must be followed for proper destruction of the wells.

If you have any questions or comments please call Lori Duncan at (209) 468-0337.

Donna Heran, REHS, Director
Environmental Health Department

Lori Duncan

Lori Duncan, Senior REHS
LOP/Site Mitigation Unit IV

Margaret Lagorio

Margaret Lagorio, Supervising REHS
LOP/Site Mitigation Unit IV

cc: James Barton, CVRWQCB
Ray Kablanow, Geological Technics, Inc.

California Regional Water Quality Control Board

Central Valley Region

Robert Schneider, Chair

Alan C. Lloyd, Ph.D.
Secretary for Environmental Protection

11020 Sun Center Drive #200 Rancho Cordova, CA 95670-6114
(916) 464-3291• Fax (916) 464-4704
http://www.swrcb.ca.gov/rwqcb5

Arnold Schwarzenegger
Governor

28 July 2005

Ms. Margaret Lagorio
Supervising REHS
San Joaquin County Environmental Health Department
304 East Weber Avenue, Third Floor
Stockton, CA 95202

NO FURTHER ACTION REQUIRED CONCURRENCE, CITY OF ESCALON AND FORMER ARCO STATION, 1305 ESCALON AVENUE, ESCALON, SAN JOAQUIN COUNTY

Board staff reviewed the 13 July 2005 Case Closure Summary submitted by the San Joaquin County Environmental Health Department (County) and the site file for the above referenced site. With the provision that the information provided to this agency was accurate and representative of site conditions, Board staff concur with the County's closure recommendation.

Until we receive notification from you that monitoring wells have been properly destroyed, transferred, or will remain in use according to the County Well Ordinance, and the County issues a Case Closure Letter, the site will be considered an open case.

If you have any questions, please call Jim Barton at (916) 464-4615.

Brian Newman

BRAIN NEWMAN
Underground Tank Program Manager
Central Valley Region

Enclosure (NFAR Checklist)

cc: Mr. Alan Patton, SWRCB Cleanup Fund, Sacramento
Ms. Lori Duncan, Senior REHS, San Joaquin County Environmental Health Department, 304 East Weber Avenue, Third Floor, Stockton, CA 95202
Mr. Doug Stidham, City of Escalon, P.O. Box 248, Escalon, CA 95320
Mr. Kuljit Mangat, 622 Clay Way, Ripon, CA 96366

TABLE 1 - CHECKLIST OF REQUIRED DATA FOR NO FURTHER ACTION REQUESTS AT UNDERGROUND TANK SITES

Site Name and Location: **City of Escalon/Former ARCO station, 1305 Escalon Ave., Escalon, San Joaquin County**

Y 1. *Distance to production wells for municipal, domestic, agriculture, industry and other uses within 2000 feet of the site;* — **A well survey in 2000 shows two public water supply wells are located approximately 1600 feet north and 1800 feet southwest of the site. One irrigation well is located approximately 750 feet to the northeast.**

Y 2. *Site maps, to scale, of area impacted showing locations of former and existing tank systems, excavation contours and sample locations, boring and monitoring well elevation contours, gradients, and nearby surface waters, buildings, streets, and subsurface utilities;* — ***One 8,000-gallon and two 10,000-gallon gasoline USTs were removed in 9/98.***

Y 3. *Figures depicting lithology (cross section), treatment system diagrams;* — ***Site lithology consists of sand, silt and clay to 115 feet, the total depth investigated.***

Y 4. *Stockpiled soil disposed off-site (quantity);* — ***The fate of approximately 100 cubic yards of contaminated excavated soil was not reported.***

Y 5. *Monitoring wells remaining on-site, fate;* — ***Six monitoring wells (MW-1 through MW-5, and MW-101), installed for this investigation, will be properly destroyed.***

Y 6. *Tabulated results of all groundwater elevations and depths to water;* — ***The depth to water varied from 61 feet (2000) to 65 feet (2005). The groundwater flow direction varied from west to northwest.***

Y 7. *Tabulated results of all sampling and analyses:*
- Y *Detection limits for confirmation sampling*
- N *Lead analyses*

Confirmation soil results in 11/98 were 6,200 mg/kg, TPHg; 2.64 mg/kg, benzene; 220 mg/kg, toluene; 140 mg/kg, ethylbenzene; 730 mg/kg, xylenes, and 8 mg/kg, MtBE. After Soil Vapor Extraction (SVE) in 9/03, soil results were 3,130 mg/kg, TPHg; 1.9 mg/kg, toluene; 30.4 mg/kg, ethylbenzene; and 194 mg/kg, xylenes. Groundwater monitoring results on 4/00 were 516 µg/L, TPHg; 62 µg/L, benzene; 42 µg/L, toluene; 10 µg/L, ethylbenzene; 57 µg/L, xylenes; and 220 µg/L, MtBE. In 5/05, groundwater monitoring results were all ND.

Y 8. *Concentration contours of contaminants found and those remaining in soil and groundwater, both on-site and off-site:* — ***The extent of contamination is defined by on-site soil borings and monitoring wells.***
- Y *Lateral and* Y *Vertical extent of soil contamination*
- Y *Lateral and* Y *Vertical extent of groundwater contamination*

Y 9. *Zone of influence calculated and assumptions used for subsurface remediation system and the zone of capture attained for the soil and groundwater remediation system;* — ***SVE, the engineered remediation system, removed approximately 1,013 gallons of gasoline from soil at this site.***

Y 10. *Reports / information* Y *Unauthorized Release Form* Y *QMRs* *22 QMRs from 4/00 to 5/05.*
Y *Boring logs* Y *PAR* Y *FRP* Y *Other* *Site Closure Report*

Y 11. *Best Available Technology (BAT) used or an explanation for not using BAT;* — ***Remove USTs, SVE and natural attenuation.***

Y 12. *Reasons why background was/is unattainable using BAT;* — ***Groundwater contamination is no longer present. Minor soil contamination remains on-site.***

Y 13. *Mass balance calculation of substance treated versus that remaining;* — ***Approximately 56 gallons of gasoline remain in soil onsite.***

Y 14. *Assumptions, parameters, calculations and model used in risk assessments, and fate and transport modeling; and* — ***A limited risk assessment was conducted in the Site Closure Report.***

Y 15. *Rationale why conditions remaining at site will not adversely impact water quality, health, or other beneficial uses.* — ***Although minor soil contamination is present onsite, based on 22 groundwater sampling events, petroleum hydrocarbons are not continuing to leach to groundwater.***

By: JLB	*Comments: One 8,000-gallon and two 10,000-gallon gasoline USTs were removed from the subject site in 9/98. Confirmation soil results in 11/98 were 6,200 mg/kg, TPHg; 2.64 mg/kg, benzene; 220 mg/kg, toluene; 140 mg/kg, ethylbenzene; 730 mg/kg, xylenes, and 8 mg/kg, MtBE. After Soil Vapor Extraction (SVE) in 9/03, soil results were 3,130 mg/kg, TPHg; 1.9 mg/kg, toluene; 30.4 mg/kg, ethylbenzene; and 194 mg/kg, xylenes. Groundwater monitoring results on 4/00 were 516 µg/L, TPHg; 62 µg/L, benzene; 42 µg/L, toluene; 10 µg/L, ethylbenzene; 57 µg/L, xylenes; and 220 µg/L, MtBE. In 5/05, groundwater monitoring results were all ND. Based on the low levels of residual soil contamination and no petroleum hydrocarbons leaching into groundwater, Regional Board staff concur with San Joaquin County's Closure Recommendation.*
Date: 7/27/05	